

IN THE SPECIFICATION:

All pages and line numberings below refer to the substitute specification filed on September 10, 2001.

The paragraph beginning at page 8, line 5 has been amended as  
5 follows:

B1 10 The dependence of the duration of the action potential [[5]] AP of the myocardium as a function parameter of the duration of the diastole  $t_d$  is designated as electric restitution. If this is spontaneously changed during a single heart cycle, for example through an extrasystole, then the action potential or its duration changes. The duration of the action potential is defined by the interval between the beginning of the stimulation and the time at which the action potential has sunk by 90%, and it decreases if the time interval between two successive stimulation pulses becomes smaller. Here a distinction is to be made between the APD change after an extrasystolic  
15 stimulation interval and the APD change after a change in the median average or basic heart frequency (HR = 1 BCL) according to prior art.

The paragraph beginning at page 8, line 19 has been amended as follows:

B2 20 The electric restitution curve (ERC) is thus defined as 25 a function of the action potential duration APD of the cycle length of a previous extrasystolic stimulation pulse interval ESI, i.e. of an individual stimulation pulse interval which is changed from the basic cycle length (BCL), i.e. the median average stimulation interval duration by  $\pm\Delta ESI$ , and which corresponds to the diastole.

B3 25 The paragraph beginning at page 9, line 16 has been amended as follows:

B3 30 As a measuring parameter to determine the electric restitution curve, as indicated above, in principle the action potential duration APD is determined which can be measured by special electrodes. Tests have shown however that in measuring the ECG also the so-called QT interval, i.e. the duration of the interval between the Q peak and the end of the T wave of the intracardiac ECG has the same restitution characteristic as the APD. When

B3  
stimulating the ventricle with a cardiac pacemaker 25 it is more expedient to measure, instead of the QT interval as the measuring interval, the stim-T interval STI, i.e. the interval between stimulation pulse and T wave.

The paragraph beginning at page 10, line 3 has been amended as  
5 follows:

B4  
Fig. 1 shows, as the electrical restitution 30 curve (continuous line), the course of the action potential duration APD in dependence on the length of individual extrasystolic intervals of a normal healthy myocardium for the rest phase and for a load phase. Here in both phases respectively the optimum adapted stimulation frequency HRo or the optimum basic cycle length BCLo = $1/HRo$  (i.e. the median average duration of the stimulation interval) was changed in individual extrasystolic stimulation intervals ESI and then the corresponding change in the action potential duration APD was measured. The restitution curves thus produced correspond to the exponential functions  
10 described by the above equation. The optimum basic cycle length BCLo for rest (90 ms) and for a load (500 ms) are represented by the broken arrows, i.e. the respective basic cycle length or median average interval duration was altered by  $\pm\Delta ESI$  to form extrasystolic intervals, and respectively as the reaction the action potential duration or the QT- or stim-T interval was  
15 measured as the measuring parameter. Here mean durations of the stimulation interval were alternately so shortened and prolonged by positive and negative  $\Delta ESI$  values that the adjusted average interval duration remains the same. Preferably the  $\pm\Delta ESI$  remains the same during a change, i.e. the interval duration is shortened and prolonged by the same value. The change  
20 measured as the measuring parameter. Here mean durations of the stimulation interval were alternately so shortened and prolonged by positive and negative  $\Delta ESI$  values that the adjusted average interval duration remains the same. Preferably the  $\pm\Delta ESI$  remains the same during a change, i.e. the interval duration is shortened and prolonged by the same value. The change  
25 can be repeated periodically at an interval of a number of pulses, however it can also be carried out continuously, i.e. each stimulation pulse is alternately shortened or prolonged.

The paragraph beginning at page 13, line 16 has been amended as follows:

*BS* 5 In another example, instead of the gradient, the relative change in the electric restitution can be used by forming the quotient  $\Delta APD/\Delta ESI$ , in each case also the median average values being able to be determined over a plurality number of change cycles.

The paragraph beginning at page 14, line 1 has been amended as follows:

*B6* 10 The functional blocks required for controlling frequency or the stimulation interval in dependence on the ERG are represented in the bordered area. As other functional blocks, which form part of the standard equipment of a normal QT pacemaker, a stimulation electrode 1 and a stimulation pulse generator supplying the stimulation electrode 1 are provided. Furthermore an ECG amplifier 2 is connected on the one hand to the 15 stimulation electrode 1 and on the other hand to a detection stage for detecting the stim-T interval as a measuring variable. Moreover such a system contains a microprocessor, which can be programmed via a telemetry 25 stage 12, with a process control 11.

*B7* 20 The paragraph beginning at page 14, line 20 has been amended as follows:

*B7* 25 The functioning of the cardiac pacemaker is as follows. 5 The stimulation pulse generator 10 supplies a stimulation pulse to the stimulation electrode and the ECG amplifier amplifies the intracardial ECG signal derived via the stimulation electrode 1. From this amplified signal, the detection stage 3 analyses the interval duration STI between the stimulation pulse and the T wave that corresponds to the QT interval or the action potential duration. In the calculation stage 4, the gradient of the electric restitution ERG is calculated, however others of the above-mentioned variables can also be used. To this end first of all, triggered by the modulator 9, the change  $\pm\Delta STI$  30 is calculated, with the stim-T interval value supplied by the detection stage, which change has been caused by the change  $\Delta ESI$  in the stimulation interval, and then the quotient  $ERG = \Delta STI/\Delta ESI$  is determined. In the median

*B7*  
average value stage 5, the median average value ERGm of the ERG values is calculated over a plurality number of change cycles. With the arrow from the exit of the median average value stage 5 to the set value memory 6 is indicated that the ERGm value, which in the body's rest state is measured at 5 a median average stimulation frequency of roughly 90/min, is stored as the set value.

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The paragraph beginning at page 15, line 15 has been amended as follows:

In the set Value/actual Value Comparator 13, the difference between  
10 the median average value of the gradient of the electric restitution ERGm and the set value ERGs is formed, and is given as the difference value  $\Delta$ ERG to the control stage 8, the latter being used to adjust the median average stimulation frequency  $HR_0$ . This is calculated for example with the aid of the following functions:  
15  $HR_0 = HR_{min} + k * \Delta ERG$ ,

*B8*  
wherein HR is so regulated that HR is < HRmax. Here HRmin and HRmax are minimum or maximum frequencies which can be predetermined by external programming and stored in the memory 7, and k is a proportionality factor. HRmin is generally predetermined by the optimum median average 20 stimulation frequency HRo in the rest state. The basic frequency HRo thus determined is supplied to the modulation stage 9, in which the basic cycle length BOL = 1/HRo is modulated periodically with an interval change  $\pm \Delta ESI$  and the resulting stimulation interval ESI = BCLo +  $\Delta ESI$  is formed. In the following stimulation pulse generator 10, the stimulation pulse is then output in 25 dependence on the ESI value. The regulation is repeated until the value  $\Delta ERG$  is zero.

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Please cancel the paragraph on page 17, beginning at line 7.